

CPO Price Fluctuations And Accounting Practices On The Resilience Of SMEs: The Moderating Role Of Working Capital

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Abstract

This study examines the effects of crude palm oil (CPO) price fluctuation and accounting practices on the financial resilience of micro, small, and medium enterprises (MSMEs) in the palm oil value chain, and tests whether working capital management moderates these relationships. Data were collected from 35 MSMEs using a five-point Likert questionnaire and analysed with partial least squares structural equation modelling (PLS-SEM), using a two-stage approach for the moderating effects and 5,000 bootstrap resamples. After one indicator of CPO price fluctuation was removed, the measurement model met the criteria for indicator reliability, composite reliability, convergent validity, and discriminant validity. Accounting practices have a positive and significant effect on financial resilience ($\beta = 0.563$; $t = 2.836$; $p = 0.008$), whereas CPO price fluctuation ($\beta = -0.005$) and working capital management ($\beta = 0.161$) are not significant. Working capital management does not moderate either relationship. The model explains 43.6% of the variance in financial resilience. The findings suggest that systematic bookkeeping and the use of accounting information are the most relevant internal capabilities for strengthening MSME resilience, although the small sample calls for cautious interpretation.

Keywords: financial resilience, accounting practices, CPO price fluctuation, working capital management, PLS-SEM

1. INTRODUCTION

Palm oil is one of Indonesia's strategic economic commodities, and its value chain involves many micro, small, and medium-sized enterprises (MSMEs), ranging from farmers and fresh fruit bunch (FFB) collectors to providers of supporting services. The price of FFB received by business operators is not determined by them, but follows the price of crude palm oil (CPO) transmitted through collectors and exporters. Nesti et al. (2026) show that the transmission of CPO prices to FFB prices for independent smallholder farmers is asymmetric and influenced by large collectors, small collectors, and exporters. This situation leaves palm oil MSMEs exposed to price shocks that are difficult to control.

In such situations, a business's ability to absorb shocks, survive, adapt, and recover financially—known as financial resilience—is the key determinant of its sustainability. Financial resilience depends not only on the level of revenue but also on the business's internal capabilities in managing its financial information and resources. Two relevant capabilities are accounting practices—which include recording transactions, preparing financial statements, archiving transaction evidence, and utilizing accounting information for decision-making—and working capital management, which involves managing cash, accounts receivable, inventory, and accounts payable.

MSMEs generally have limited resources: little equity capital, limited access to formal financing, and financial

records that are often intermingled with personal finances. These limitations mean that price shocks quickly turn into cash flow problems, such as delays in paying wages, rent, or debts to suppliers. Since CPO prices are beyond the control of business owners, attention needs to be directed toward internal factors that can be improved—namely, how businesses record, report, and manage their finances.

Previous research has shown that working capital management is associated with the performance of small and medium-sized enterprises (Deloof, 2003; Eton et al., 2025) and that working capital practices change when SMEs face external shocks (Iqbal et al., 2023). However, studies that examine the combined effects of CPO price fluctuations and accounting practices on the financial resilience of SMEs, while also testing the role of working capital as a moderating variable, are scarce in the literature reviewed by the author. This study aims to (1) examine the effects of CPO price fluctuations and accounting practices on the financial resilience of MSMEs, (2) examine the effect of working capital management on financial resilience, and (3) examine the moderating role of working capital management in both relationships.

Literature Review and Hypothesis Development

Organizational resilience is understood as a capability that encompasses anticipation, management, and adaptation to shocks (Duchek, 2020), while studies on organizational responses to adversity emphasize the importance of the resources and actions mobilized when a crisis occurs (Williams et al., 2017). In this study, financial resilience is defined as a business's capability to absorb financial

shocks, survive, adapt, and recover from economic instability or financial pressure. The theoretical foundations are *the resource-based view* (Barney, 1991) and *dynamic capabilities* (Teece et al., 1997), which view internal resources and capabilities as determinants of a business's ability to cope with a changing environment.

CPO price fluctuations and financial resilience. Sharp price changes disrupt the revenue and cash flow of businesses that rely on fresh fruit bunches (FFB) or palm oil derivatives. The more frequent and severe the price shocks, the greater the pressure on these businesses' ability to survive and recover. Therefore, H1: CPO price fluctuations have a negative effect on the financial resilience of MSMEs.

Accounting practices and financial resilience. Well-organized record-keeping and readily available financial statements enable business owners to determine their cash position, expenses, and profits in a timely manner, allowing them to make adjustments more quickly. A study on management accounting in SMEs positions accounting information as the foundation for small business decision-making (Lavia López & Hiebl, 2015). Therefore, H2: Accounting practices have a positive effect on the financial resilience of MSMEs.

Working capital management. The management of cash, accounts receivable, inventory, and accounts payable maintains daily liquidity, enabling businesses to continue meeting their obligations even when revenue declines (Deloof, 2003; Eton et al., 2025). Therefore, H3: working capital management has a positive effect on the financial resilience of MSMEs.

Well-managed working capital also serves as a buffer that can mitigate the impact of price shocks and enhance the benefits of accounting information, since information-based decisions are only effective if the business has the liquidity to implement them. Therefore, H4: working capital

management moderates the effect of CPO price fluctuations on financial resilience, and H5: working capital management moderates the effect of accounting practices on financial resilience. The conceptual framework is shown in Figure 1.

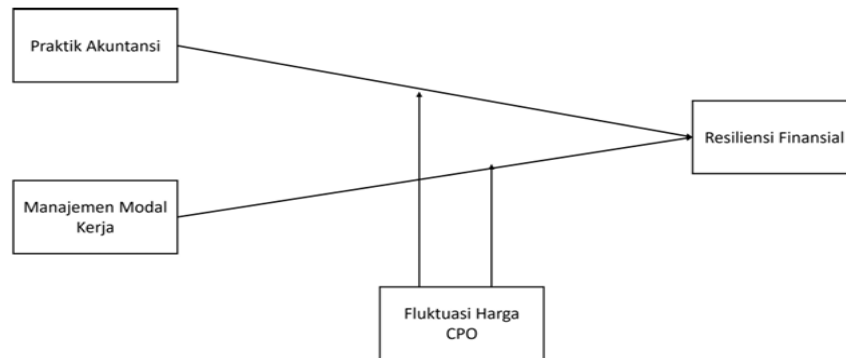


Figure 1. Conceptual Framework of the Study

2. METHOD

This study employs an associative quantitative approach using a survey method. The research subjects are MSMEs in the palm oil value chain in North Sumatra. The sample consists of 35 MSMEs selected using purposive sampling, based on the criteria of being active businesses and deriving income from fresh fruit bunches (FFB) or their derivatives. Primary data were collected through a closed-ended questionnaire using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Prior to analysis, the data were checked for completeness and outliers; all 35 questionnaires were fully completed, and response scores fell within the range of 1 to 5. Data processing was conducted in two stages: evaluation of the measurement model (*outer model*) and evaluation of the structural model (*inner model*), following

the PLS-SEM reporting guidelines (Hair et al., 2019; Chin, 1998)

The instrument consists of 42 items for four constructs. Each indicator is measured by three items, and the indicator score is calculated as the average of those three items, resulting in a model with 14 reflective indicators (Table 1). Financial resilience serves as the endogenous variable, CPO price fluctuations and accounting practices as exogenous variables, and working capital management acts as both an exogenous variable and a moderator.

Table 1. Operational Definitions of Variables

Variable	Indicator
CPO Price Fluctuations (X1)	Price volatility (X1.1); frequency of extreme price shocks (X1.2)
Accounting Practices (X2)	Transaction recording (X2.1); preparation of financial statements (X2.2); archiving of transaction evidence (X2.3); use of accounting information for decision-making (X2.4)

Variabel	Indicator
Working Capital Management (Z)	Liquidity and emergency reserves (Z.1); accounts receivable policy (Z.2); inventory policy (Z.3); accounts payable policy (Z.4)
Financial Resilience of MSMEs (Y)	Adaptive capacity (Y1.1); resilience (Y1.2); recovery capacity (Y1.3); access to external support (Y1.4)

The data were analyzed using *partial least squares structural equation modeling* (PLS-SEM) because the model involved several latent constructs, moderating effects, and a limited sample size (Hair et al., 2019). Estimation used a *path weighting* scheme with a reflective measurement mode. The measurement model was evaluated based on *outer loadings* (≥ 0.70), *average variance extracted* ($AVE \geq 0.50$), the Fornell-Larcker criteria (Fornell & Larcker, 1981), and *the heterotrait-monotrait ratio*.

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistics

All indicators had means ranging from approximately 3.3 to 3.5 on a 1–5 scale, indicating that respondents' ratings tended to fall into the "fair" to "good" categories (Table 2). Standard deviations ranged from 0.53 to 0.77, indicating that respondents' answers varied sufficiently to be analyzed.

Table 2. Descriptive Statistics for the Indicator

Indikator	Mean	Standand Deviation
X1.1	3,49	0,53
X1.2	3,46	0,59
X2.1	3,32	0,68
X2.2	3,29	0,71
X2.3	3,37	0,70
X2.4	3,30	0,73
Z.1	3,44	0,64
Z.2	3,40	0,65
Z.3	3,50	0,72
Z.4	3,31	0,57
Y1.1	3,43	0,69
Y1.2	3,50	0,77
Y1.3	3,47	0,75

Indikacor	Mean	Standand Deviation
Y1.4	3,45	0,74

(HTMT < 0.90) (Henseler et al., 2015). The structural model evaluation included the variance inflation factor (VIF), the coefficient of determination (R^2), effect sizes (f^2) with thresholds of 0.02, 0.15, and 0.35 (Cohen, 1988), and path coefficients

The moderating effect was tested using a two-stage approach: the latent scores from the first stage were multiplied to form the interaction terms $X1 \times Z$ and $X2 \times Z$ (Henseler & Fassott, 2010). The structural model is presented in Equation (1), with ζ as the error term. Significance was tested via bootstrapping of 5,000 subsamples using a two-tailed test at the 5% level ($t\text{-value} > 1.96$ or $p < 0.05$; Hair et al., 2022).

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 Z + \beta_4 (X_1 \times Z) + \beta_5 (X_2 \times Z) + \zeta \quad (1)$$

3.2 Evaluation of the Measurement Model

In the initial estimation, all indicators had *outer loadings* above 0.85 except for X1.2 (frequency of extreme price shocks), which reached only 0.103 (Table 3). This value is well below the threshold of 0.40, so the indicator was removed (Hair et al., 2019), and the CPO price fluctuation construct was subsequently represented by a single indicator, price volatility (X1.1). After the adjustment, all *outer loadings* fell within the range of 0.859 to 0.944 and were significant at the 5% level ($t > 15$). The single indicator was not subjected to a t -test, as its loading remains 1.000 by definition

Table 3. Outer Loading Indicators

Indicator	Initial Loading	Final Loading	t-Value
X1.1	0,879	1,000	–
X1.2	0,103	Dihapus	–
X2.1	0,900	0,900	23,59
X2.2	0,889	0,889	19,27
X2.3	0,944	0,944	46,75
X2.4	0,935	0,935	37,35
Z.1	0,887	0,887	16,13
Z.2	0,888	0,888	15,99
Z.3	0,881	0,881	20,64
Z.4	0,912	0,912	28,07
Y1.1	0,877	0,875	15,66
Y1.2	0,909	0,909	23,91
Y1.3	0,940	0,941	37,90
Y1.4	0,859	0,859	17,58

Construct reliability meets the criteria: Cronbach's alpha, rho_A, and the composite reliability of the three multi-indicator constructs are all above 0.90 (Table 4). AVE values range from 0.796 to 0.842, well above 0.50, thus fulfilling the criteria for convergent validity. Very high reliability values should be examined carefully, as they may indicate that the items are too similar (redundant).

Table 4. Reliability and Convergent Validity

Construct	α	rho_A	CR	AVE
CPO Price Fluctuations	–	–	1,000	1,000
Accounting Practices	0.937	0.941	0.955	0.842
Working Capital Management	0.915	0.922	0.940	0.796
Financial Resilience of MSMEs	0.919	0.925	0.943	0.804

Note: Constructs with a single indicator do not have α and rho_A; CR and AVE are 1.000.

Discriminant validity was first examined through cross-loadings (Table 5): each indicator had the highest loading on its own construct. The examination continued with the Fornell-Larcker and HTMT criteria. The AVE root of each construct was greater than its correlation

with other constructs (Table 6), and all HTMT values were below 0.90 (Table 7; maximum 0.679), thus fulfilling the criteria for discriminant validity.

Tabel 5. Cross Loading

Indikator	FH	PA	MM	RF
X1.1	1,000	–0,248	0,026	–0,131
X2.1	–0,341	0,900	0,531	0,606
X2.2	–0,190	0,889	0,518	0,526
X2.3	–0,157	0,944	0,515	0,621
X2.4	–0,218	0,935	0,518	0,578
Z.1	0,213	0,562	0,887	0,410
Z.2	0,084	0,432	0,888	0,357
Z.3	–0,063	0,501	0,881	0,430
Z.4	–0,111	0,519	0,912	0,469
Y1.1	–0,213	0,602	0,451	0,875
Y1.2	–0,111	0,635	0,405	0,909
Y1.3	–0,020	0,551	0,428	0,941
Y1.4	–0,121	0,478	0,402	0,859

3.3 Structural Model Evaluation

The VIF values for all predictors range from 1.12 to 1.74, well below 3, indicating no multicollinearity issues (Table 8). The model with the moderating effect explains 43.6% of the variance in financial resilience ($R^2 = 0.436$; adjusted $R^2 = 0.338$), which falls into the moderate category. Without the interaction term, R^2 was 0.424, so the addition of the moderation effect only increased it by

0.012. The largest effect size (f^2) was found for accounting practices (0.337, moderate category), while working capital management (0.026) was only in the small category, and price fluctuations as well as both moderation effects can be disregarded

Tabel 8. Multicollinearity

Path	VIF
FH → RF	1,12
PA → RF	1,67
MM → RF	1,74
MM × FH → RF	1,14
MM × PA → RF	1,14

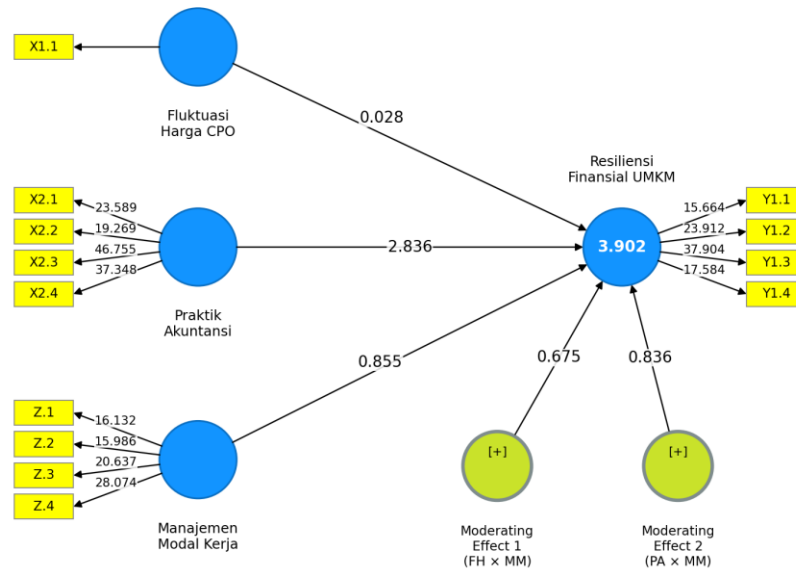


Figure 2. Bootstrapping Results (t-Values)

Table 9. Hypothesis Test Results

Hypothesis	Path	β	SE	t	p	Decision
H1	FH $\rightarrow$ RF (-)	-0.005	0.185	-0.028	0.978	Rejected
H2	PA $\rightarrow$ RF (+)	0.563	0.199	2.836	0.008	Accepted
H3	MM $\rightarrow$ RF (+)	0.161	0.189	0.855	0.398	Rejected
H4	MM $\times$ FH $\rightarrow$ RF	-0.071	0.106	-0.675	0.504	Rejected
H5	MM $\times$ PA $\rightarrow$ RF	-0.102	0.122	-0.836	0.409	Rejected

3.4 Comparison of Models With and Without Moderation

To ensure that the results do not depend on the moderation specifications, the path coefficients of the main model (without interaction terms) were compared with those of the model including moderation (Table 10). The accounting practices coefficient remained large and positive in both models (0.546 and 0.563), while the CPO price fluctuations and working capital management coefficients remained small. The change in R^2 was only 0.012, so the main conclusions remain consistent.

Table 10. Path Coefficients for the Main Model and the Moderation Model

Path	Without Moderation	With Moderation
FH $\rightarrow$ RF	-0.000	-0.005
PA $\rightarrow$ RF	0.546	0.563
MM $\rightarrow$ RF	0.161	0.161
MM $\times$ FH $\rightarrow$ RF	—	-0.071
MM $\times$ PA $\rightarrow$ RF	—	-0.102
R^2	0.424	0.436

3.5 Discussion

Fluctuations in CPO prices do not have a significant effect (H1 is rejected). The path coefficient of CPO price fluctuations on financial resilience is nearly zero (-0.005 ; $t = -0.028$; $p = 0.978$). These results are inconsistent with the initial hypothesis. One possible

explanation is that, in this dataset, price shocks were felt equally by all businesses, so they did not differentiate the levels of resilience among respondents; differences in resilience were more determined by how businesses managed themselves. A second explanation is methodological: after one indicator was removed, this construct was measured by only one perception indicator, thus limiting the accuracy of the measurement. Actual price data (e.g., the coefficient of variation for monthly fresh fruit bunches [FFB] prices) should be used as a supplement in future research.

Accounting practices have a positive and significant effect (H2 accepted). Accounting practices are the only significant predictor (0.563; $t = 2.836$; $p = 0.008$; $f^2 = 0.337$). SMEs that routinely record transactions, prepare financial statements, archive supporting documents, and use accounting information in decision-making demonstrate a greater ability to survive, adapt, and recover. These findings align with the resource-based view, which posits that reliable financial information is an internal resource that supports business capabilities (Barney, 1991; Lavia López & Hiebl, 2015). In practical terms, accounting information enables owners to know when cash is running low and when selling prices need to be adjusted.

Working capital management does not have a significant direct effect (H3 is rejected). The coefficient for working capital management is positive but not significant (0.161; $t = 0.855$; $p = 0.398$). The simple correlation between the two constructs is fairly strong (0.471), but this effect disappears once accounting practices are included in the model, as the two constructs are highly correlated with

each other (0.567). In other words, the portion of working capital benefits related to resilience is largely already captured by accounting practices. This pattern needs to be retested on a larger sample, including the possible mediating role of accounting practices.

Working capital management does not have a moderating effect (H4 and H5 are rejected). The interaction terms $X1 \times Z$ (-0.071 ; $p = 0.504$) and $X2 \times Z$ (-0.102 ; $p = 0.409$) are not significant, and their effect sizes are negligible. The hypothesis that adequate working capital cushions price shocks or enhances accounting benefits is not supported by these data. It should be noted that moderation tests require greater statistical power than direct effect tests; therefore, with only 35 respondents, the absence of a moderating effect cannot be conclusively established.

3.6 Implications

For MSME owners, these results show that the most controllable step to strengthen business resilience is not predicting the direction of CPO prices, but rather establishing disciplined record-keeping practices. The four indicators of accounting practices have high loadings, making them all relevant: recording daily transactions, preparing simple income statements and cash flow statements, archiving receipts and invoices, and using these figures to set prices and purchase materials.

For MSME supporters—namely relevant government agencies, cooperatives, and financial institutions—these findings support the provision of simple bookkeeping training directly linked to day-to-day decisions, such as determining cash reserves and debt repayment schedules. For researchers,

these results open up two avenues of inquiry: testing the possibility that working capital operates through accounting practices (mediation), and expanding the measurement of price fluctuations using actual price data so that their impact can be tested more rigorously.

Limitation. First, the sample size ($n = 35$) is relatively small, resulting in a large standard error of the coefficients and findings that are sensitive to the data. Second, all variables were measured based on respondents' perceptions at a single point in time, posing a risk of common-method bias. Third, fluctuations in CPO prices are represented by only one indicator in the final model. The results should therefore be interpreted as preliminary indications rather than generalizations.

4. CONCLUSION

Accounting practices were found to have a positive and significant effect on the financial resilience of palm oil MSMEs ($\beta = 0.563$; $p = 0.008$). CPO price fluctuations and working capital management had no significant effect, and working capital management did not moderate the relationship between the two and financial resilience. The model explains 43.6% of the variance in financial resilience. For MSME operators, these findings highlight that recording and utilizing accounting information are the most tangible steps to strengthen business resilience; therefore, capacity-building efforts by the government, cooperatives, or financial institutions should prioritize training in basic bookkeeping.

Future research is recommended to use a larger sample, supplement

respondents' perceptions with actual fresh fruit bunch (FFB) price data and business financial data, add indicators to the price fluctuation construct, and test the mediating role of accounting practices between working capital and financial resilience.

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